

Deep Learning Approaches Applied to Remote Sensing Datasets for Road Extraction: A State-Of-The-Art Review

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Abstract

One of the most challenging research subjects in remote sensing is feature extraction, such as road features, from remote sensing images. Such an extraction influences multiple scenes, including map updating, traffic management, emergency tasks, road monitoring, and others. Therefore, a systematic review of deep learning techniques applied to common remote sensing benchmarks for road extraction is conducted in this study. The research is conducted based on four main types of deep learning methods, namely, the GANs model, deconvolutional networks, FCNs, and patch-based CNNs models. We also compare these various deep learning models applied to remote sensing datasets to show which method performs well in extracting road parts from high-resolution remote sensing images. Moreover, we describe future research directions and research gaps. Results indicate that the largest reported performance record is related to the deconvolutional nets applied to remote sensing images, and the F1 score metric of the generative adversarial network model, DenseNet method, and FCN-32 applied to UAV and Google Earth images are high: 96.08%, 95.72%, and 94.59%, respectively.